VIDALIGNER

INSTRUCTION MANUAL

for the

VIDALIGNER

KAY ELECTRIC COMPANY

Pine Brook, N. J.

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TABLE OF CONTENTS

Page

SECTION I, GENERAL DESCRIPTION

A. APPLICATION..... 1
B. FEATURES..... 1
C. SPECIFICATIONS..... 1
D. EQUIPMENT SUPPLIED..... 2

SECTION II, INSTALLATION

A. GENERAL..... 2
B. INTERCONNECTION DATA..... 2
C. CRYSTAL FREQUENCIES..... 3

SECTION III, OPERATION

A. IDENTIFICATION OF CONTROLS..... 3
B. OPERATING INSTRUCTIONS..... 5

SECTION IV, THEORY OF OPERATION

A. GENERAL..... 6
B. SAWTOOTH SWEEP CIRCUITS..... 6
C. SWEEPING OSCILLATOR CIRCUITS..... 7
D. MODULATOR & RF AMPLIFIER CIRCUITS..... 8
E. MARKER CIRCUITS..... 9

SECTION V, MAINTENANCE

A. TROUBLE LOCATION..... 10
B. ALIGNMENT & ADJUSTMENT..... 11

SECTION VI, 200A POWER SUPPLY

A. DESCRIPTION..... 14
B. POWER SUPPLY CIRCUIT DETAILS..... 14
C. MAINTENANCE..... 15

SECTION VII, PARTS LIST

A. POWER SUPPLY..... 15
B. MAIN CHASSIS..... 16

LIST OF ILLUSTRATIONS

Figure 1, **VIDALIGNER**
Figure 2, INTERCONNECTION BLOCK DIAGRAM - KA 5548 A
Figure 3, FUNCTIONAL BLOCK DIAGRAM - KA 5156
Figure 4, TOP OF CHASSIS, COMPONENT LOCATION
Figure 5, BOTTOM OF CHASSIS, COMPONENT LOCATION
Figure 6, SCHEMATIC - KD 4438 C
Figure 7, POWER SUPPLY - KB 2548 K

Figure 1, **VIDALIGNER**

SECTION I

GENERAL DESCRIPTION

APPLICATION.

The **VIDALIGNER** is a wide-band r-f sweeping oscillator, designed for general laboratory, production, and servicing use in testing and aligning radar, television, and other FM circuitry. In conjunction with an oscilloscope, it may be used to display a graphic representation of the frequency versus amplitude characteristics of the circuit under test. It may be employed to measure the bandpass characteristics of filters, amplifiers, and similar circuits without the necessity for point-by-point measurements. One variable marker and a series of eight, pulse-type markers are provided to identify specific points on each of the three sweeping oscillator ranges.

FEATURES.

The **VIDALIGNER** is composed basically of a sawtooth generator, a sweeping oscillator, a fixed marker generator, and a variable marker generator. The sawtooth sweep circuits generate a linear sawtooth voltage "locked-in" with or around the 60-cps line frequency. This voltage is used both as a horizontal deflection signal for the scope and to drive the sweeping oscillator through the selected sweep range.

The sweeping oscillator circuits utilize saturable reactor techniques to generate a 0-8 Mc sweeping output. The sweep width may be set to 0-2 Mc, 0-5 Mc, or 0-8 Mc, by means of a three position rotary switch.

The fixed marker utilizes the output of the sweeping oscillator to generate eight, pulse-type crystal-controlled markers and a single variable marker. By connecting the separate marker output jack directly to the 'scope, it is possible to obtain markers that are independent of the circuit under test and neither disappear in traps nor overload the circuit.

Alternatively, the necessity for a separate marker lead may be eliminated by using eight fixed and one variable "suck out" type markers, imposed on the sweeping output by momentarily disabling the sweeping oscillator as it passes thru each marker frequency. An electronically-regulated power supply furnishes B+ and filament power required to operate the **VIDALIGNER**. The entire assembly is enclosed in a single metal cabinet, with complete internal and external shielding.

SPECIFICATIONS.

SWEEP: Regular sawtooth, synchronized with the sweeping r-f frequency output. Adjustable around or synchronized to the 60 cps line frequency. Output 6 volts peak-to-peak.

SWEEPING OUTPUT:

Frequency Range. 0-8 Mc, in ranges of 0-2 Mc, 0-5 Mc, 0-8 Mc.

Sweep Width: entire width of sweeping range in use.

Amplitude Modulation While Sweeping: less than ± .5 db.

Maximum R-F Output: At least .75V rms into 70 ohms.

R-F Output Control: switched attenuators at 20 db, 20 db, 6 db and 3 db, accurate to within ±10%. Continuous attenuator with approx. 6 db range.

MARKERS: May be used either as positive pulse-type markers with separate output, or as "suck-out" type markers, imposed on the sweeping output.

Fixed Markers: Eight pulse-type, crystal-controlled markers, located at any specified points in the sweeping range, may be used collectively or individually.

Frequency accuracy: ±0.1%

Maximum output voltage: positive pulse, at least 5V into 70 ohms.

Output voltage control: continuously variable, zero to maximum.

Variable Marker:

Frequency: continuously variable within selected sweeping range.

Frequency calibration: accurate to within ±50 kc.

POWER SUPPLY:

Input Required: approximately 160w, 117V (±10%), 60-cps, a-c power.

Output: Electronically-regulated B+ and filament supplies.

DIMENSIONS: 16½" x 10" x 22".

WEIGHT: 55 lbs.

. EQUIPMENT SUPPLIED.

1. **VIDALIGNER**, complete with tubes and crystals (standard or as specified).
2. Instruction Book.
3. R-F output cable.
4. Cabinet.
5. Power supply.

SECTION II
INSTALLATION

. GENERAL.

The **VIDALIGNER** is designed for table-top operation and thus presents no special nstallation problems. However, for optimum operation, the equipment should not be ubjected to excessive moisture, vibration, or temperature conditions. The installtion should include provisions for connection to the oscilloscope, to the equipent under test, and to a 230 watt source of 117-volt (±10%), 50-60 cps, a-c power.

. INTERCONNECTION DATA.

1. OSCILLOSCOPE CONNECTIONS *(refer to figure 2)*.

a. Connect the SWEEP OUTPUT terminals directly to the horizontal axis input terminals of the oscilloscope.

b. Connect the PIP OUTPUT terminals directly to the vertical axis of the oscilloscope. If the addition of the marker signals appears to alter the shape of the response curve, insert a series 47K non-inductive resistor at the oscilloscope end of the cable between the PIP terminals and the oscilloscope.

2. EQUIPMENT UNDER TEST. The VIDALIGNER is designed to work into a 70-ohm impedance. If the input impedance of the equipment under test matches this value, use the output cable supplied with the VIDALIGNER to make a direct connection from the SWEEPing OSCillator OUTPUT jack to the circuit input. If the impedance match is important and the input impedance of the circuit under test differs substantially from 70 ohms, an impedance-matching network must be used between the VIDALIGNER output and the circuit input. For optimum operation, the length of all interconnecting cables should be kept to a minimum.

3. VARIABLE FREQUENCY MARKER. A variable frequency marker is incorporated in the design of the unit and is available at the same panel terminals as the fixed markers.

. CRYSTAL FREQUENCIES.

The crystal-controlled fixed marker frequencies are normally selected by the ustomer to fit specific needs. However, if it should become necessary to change a rystal frequency, this may be done by replacing the unwanted marker crystal with ne cut for a frequency 30 Mc above the desired marker frequency. Then realign the arker circuits as described in Section V, paragraph B-5.

SECTION III
OPERATION

. IDENTIFICATION OF CONTROLS.

1. ON-OFF Switch *(S-1)*. This toggle switch controls the application of all a-c and d-c power to the VIDALIGNER. When it is in the ON position, the adjacent red lamp marked POWER, comes on, indicating that the power supply filament and sawtooth voltage circuits have been energized.

2. STANDBY Switch *(S-2)*. This toggle switch controls the application of B+ power to the frequency-generating circuits except those of the equipment. When both this switch and the ON-OFF switch are in the ON position, the VIDALIGNER is ready to operate.

3. SWEEP OUTPUT terminals *(J-1)*. These terminals bring out a sawtooth sweep voltage, synchronized with the sweeping output, which may be used as a horizontal deflection voltage for the external oscilloscope. These terminals are normally connected to the horizontal (X-axis) terminals of the oscilloscope. The sweep rate of this voltage is determined by the setting of the adjacent REPetition RATE control.

4. REPetition RATE Control *(R-11)*. This potentiometer provides a means of varying the sweep rate of the sawtooth voltage appearing at the SWEEP OUTPUT terminals. In normal operation the sawtooth sweep is "locked-in" at the 60-cps

line frequency and this control is adjusted to produce a stable pattern on the oscilloscope. However, for special tests such as hum measurement, the repetition rate may be varied over a 50-100 cps range.

5. SWEEP WIDTH Control *(S-3)*. This rotary switch is used to set the width of the sweeping output signal to one of the three standard ranges 0-2 Mc, 0-5 Mc, 0-8 Mc. The **VIDALIGNER** is designed to sweep the entire width of the selected range.

6. CENTERING Control *(R-32)*. This potentiometer is used as a fine centering adjustment for the sweeping range in use. It shifts the entire sweeping band simultaneously.

7. Sweeping Oscillator Output Controls. These five controls, comprising one variable attenuator, marked INCREASE (+6 db) and four switchable, fixed attenuators, marked 20 DB, 20 DB, 6 DB and 3 DB, are located immediately below the SWEEP WIDTH control. They may be used individually or collectively to control the amplitude of the sweeping r-f signal appearing at the adjacent coaxial SWEEPing OSCillator OUTPUT connector. The effects of these controls are additive and provide a total attenuation range of 55 db for the sweeping oscillator output.

8. SWEEPing OSCillator OUTPUT Jack *(J-3)*. This coaxial connector, located at the right side of the front panel, delivers the final output of the sweeping oscillator. According to the setting of the adjacent attenuators, the output may vary over a range of zero-1.5 volts rms into 70 ohms. This jack is normally connected directly to the input of the circuit under test.

9. MARKERS Controls *(S-9 thru S-16)*. Each of these toggle switches controls one of the eight crystal-controlled fixed markers provided in the **VIDALIGNER**. When the INTernal PIP switch is in the off position, these markers may be used as external positive pulse markers, available through a separate PIP OUTPUT jack, thus providing markers whose amplitude is independent of both the sweeping oscillator and the characteristics of the circuit under test. Alternatively, when the INTernal PIP switch is in the on position, they are available as "suck-out" type markers, imposed on the sweeping frequency output. The markers within each range may be used individually or collectively as required.

10. PIP ADJust Control *(R-70)*. The proper setting for this potentiometer is a point midway between the setting at which one or more crystal-controlled markers disappears and the setting at which multiple or spurious pips appear. In addition, this control acts as a vernier for the internal pip multivibrator adjustment.

11. INTernal PIP Switch *(S-4)*. When this toggle switch is in the on position, the variable marker and any of the fixed markers that are energized appear as "suck-out" type markers in the sweeping output. When *S-4* is in the OFF position, the markers are available at the PIP OUTPUT jack as positive, pulse-type markers, and are fed directly to the oscilloscope.

12. Pip INCREASE Control *(R-87)*. The setting of this potentiometer, located immediately to the left of the PIP OUTPUT terminals, determines the amplitude of the fixed markers appearing on the scope. The amplitude of the fixed markers is variable over a range of zero-5 volts according to the setting of this control.

approx.

13. PIP OUTPUT Jack *(J-2)*. When one or more of the markers switches is in the upper (ON) position, the corresponding crystal-controlled markers appear at these GR terminals. They are normally connected directly to the veritcal (Y-axis) input of the scope, thus providing markers whose amplitude is independent of the characteristics of the circuit under test.

14. VARIABLE MARKER Control *(C-29)*. This variable capacitor whose dial is calibrated in 100 Kc divisions from zero to 8 Mc, is used to set the frequency of the variable marker to any point within the range of use. Like the fixed markers, the variable marker may be used either as a positive pulse with a separate output or as a "suck-out" marker on the sweeping output. The smaller adjacent control is a fine frequency control which may be used in calibrating the variable marker while comparing it with one of the fixed, crystal-controlled markers.

NOTE: The following internal potentiometers and capacitors are factory-adjusted and normally should not be changed unless necessitated by component replacement or serious misalignment of the equipment.

15. Internal Pip Adjustment *(R-84)*. This potentiometer, located on the right side of the chassis is used in conjunction with the front-panel PIP ADJust control *(R-70)* to regulate the number of pips appearing on the scope. It is properly adjusted when the range of the front-panel control is maximized.

16. Sync Lock Control *(R-9)*. This potentiometer, located on the rear of the chassis deck is used, in conjunction with the REPetition RATE control, to determine the sweep rate of the sawtooth voltage. It is normally set to lock the sawtooth sweep, and thus the sweeping output, to the 60-cps line frequency.

17. Sweep Width Control *(R-25)*. This potentiometer, located on the left side of the chassis, is used to adjust the width of the sweeping output to the proper range. This control is used in conjunction with three variable capacitors *(C-17, C-19, C-22)* in the plate of the sweeping oscillator and is normally adjusted with the SWEEP WIDTH control *(S-3)* on the "0-8 Mc" position.

18. Blanking Control *(R-21)*. This potentiometer, located on the right side of the chassis deck, immediately in front of the sweeping oscillator is properly adjusted when the entire flyback trace on the scope is eliminated without the presence of fold-overs.

19. Variable Marker Adjustment *(R-53)*. This potentiometer, located in front of the chassis deck should be set to allow a single stable variable marker to appear on the scope.

OPERATING INSTRUCTIONS.

1. Connect the equipment as described in Section II, Installation.

2. Throw the ON-OFF switch to the ON position. The adjacent red indicator should come on.

3. After 30 seconds, throw the STANDBY switch to the ON position.

4. Set SWEEP WIDTH switch to desired sweep range: 0-2 Mc, 0-5 Mc, or 0-8 Mc.

5. Adjust REPetition RATE control until a stable pattern is produced on the scope.

6. Use sweeping oscillator output INCREASE control and four switchable attenuators to set amplitude of sweep trace to desired magnitude.

7. Energize crystal-controlled MARKERS as desired. Rotate PIP ADJust control until full stable complement of energized markers appears on scope without the appearance of multiple or spurious pips. Adjust pip INCREASE control until the fixed markers are of satisfactory height.

8. Rotate VARIABLE MARKER control until its setting corresponds to that of nearest crystal-controlled marker. Adjust adjacent calibration control until variable marker coincides with crystal-controlled marker.

9. Readjust VARIABLE MARKER control to desired frequency.

10. If negative, "suck-out" type marker is desired, throw the INTernal PIP switch to the on position. If separate marker output is more advantageous, set INTernal PIP switch to off position.

SECTION IV
THEORY OF OPERATION

GENERAL.

The operation of the **VIDALIGNER** may be more readily comprehended by referring to *Figure 3*, the functional block diagram, and *Figure 6*, a complete schematic of the frequency generating circuits. In addition to a regulated power supply the basic circuits of the **VIDALIGNER** include:

1. Sawtooth generator circuits.

2. Sweeping oscillator citcuits.

3. Modulator amplifier circuits

4. Marker circuits.

SAWTOOTH SWEEP CIRCUITS.

The sawtooth generator circuits produce a 60-cps signal which is used as a horizontal sweep voltage on the oscilloscope. The sweeping oscillator circuit generates a sweeping frequency which is fed through the circuit under test. The output of the test circuit is then fed to the Y-axis of the oscilloscope. Since the magnitude of the sweeping signal fed to the test circuit is constant across the entire range, the response characteristics of the circuit under test are graphically displayed on the oscilloscope screen. For identification of specific points along the scope trace, eight crystal-filter, absorption-type circuits are used. In addition, a ninth marker whose frequency is continuously variable over the sweeping range in use, is provided. All nine markers may be used as positive, pulse-type markers, available at a separate MKR OUTPUT jack. Alternatively, by momentarily disabling the sweeping oscillator at each marker frequency, the may be used as "suck-out" type markers, imposed on the sweeping output, thus eliminating the necessity for a separate marker output connection.

These circuits generate a regular sawtooth voltage which is normally "locked-in" the 60-cps power line frequency. For hum measurements and other special tests, s rate may be varied over a range of 50-100 cps by adjusting two potentiometer trols. This sawtooth signal is used both as a horizontal deflection voltage for oscilloscope and to drive the sweeping oscillator thru the selected operating ge.

1. **SYNC GENERATOR** *(V-1)*. This stage uses a 5963 dual triode in a Schmitt trigger circuit to generate a negative synchronizing pulse for the succeeding square wave generator. A small portion of the 60-cps filament voltage is fed directly to the grid (pin 2) of the first stage. The repetition rate of the sync generator is controlled by this pulse and the setting of the internal sync lock control, *R-9*.

2. **SQUARE WAVE GENERATOR** *(V-2)*. This 6J6 square wave generator is essentially a free-running multivibrator whose repetition rate is determined both by the setting of the REPetition RATE control and the operation of the preceding sync generator *(V-1)*. To provide a clear, zero-voltage reference line on the 'scope, the square wave output is fed to the grids of the sweeping oscillator *(V-4)* which is thus disabled during the negative portion of the square wave generator's output. In addition, the square wave signal is fed to an integrating network *(R-17, C-9, R-18, & C-10)* which shapes it to a regular sawtooth waveform. This voltage is subsequently fed both to the SWEEP OUTPUT terminals *(J-1)*, where it is used as a horizontal deflection voltage for the 'scope, and to the sawtooth amplifier *V-3*. The 0-2, 0-5, and 0-8 Mc sweeping output is obtained by mixing the output of a sweeping oscillator operating in the 30-38 Mc range with the 30-Mc output of a crystal-controlled "local" oscillator.

SWEEPING OSCILLATOR CIRCUITS.

These sweeping oscillator circuits utilize saturable reactor techniques to nerate a linear sweeping voltage, synchronized to the sawtooth SWEEP OUTPUT oltage, and covering part or all of the 30-38 Mc range. The circuitry includes sawtooth amplifier *(V-3)* and a sweeping oscillator whose output is used both as sweeping frequency for the circuits under test and to synthesize the fixed arkers.

1. **SAWTOOTH AMPLIFIER** *(V-3)*. This stage employs a 6V6 pentode to provide amplification of the 60-cps signal produced by the shaping network. The plate lead for this tube includes the control winding of a saturable reactor in the plate circuit of the sweeping oscillator. As the plate current of *V-3* varies, it causes a corresponding variation in the inductance of the saturable reactor secondary and thus in the output frequency of the sweeping oscillator. The settings of the SWEEP WIDTH switch *(S-3)*, and the internal sweep width potentiometer *(R-25)* control the amplitude of the sawtooth voltage applied to the grid of *V-3* and thus the duration (width) of the sweeping output at *V-4*.

2. **SWEEPING OSCILLATOR** *(V-4)*. This 12AT7 dual triode is used to generate a sweeping output in the 30-38 Mc range. The frequency at any given time is determined by the permeability of the saturable reactor secondary *(L-18)*, and thus by the magnitude of sawtooth amplifier plate current which saturates the control winding *(L-1a)*. To provide a bright, zero-voltage reference line on the scope, a portion of the square wave generator *(V-2)* output is used to disable the sweeping oscillator during the negative half cycles of operation.

The variable "suck-out" type marker in the sweeping output is produced by injecting a negative pulse, whose frequency is determined by the setting of the VARIABLE MARKER control, into the center tap of the saturable reactor secondary and thus momentarily disabling the sweeping oscillator once during each cycle of operation. The output of the sweeping oscillator is fed to the variable marker circuit and to two separate buffer amplifiers, one in the modulation circuits *(V-14)* and one in the fixed markers circuits *(V-15)*.

MODULATOR & RF AMPLIFIER CIRCUITS.

These circuits convert output of the sweeping oscillator to a frequency in the Kc to 8 Mc range, and provide the necessary amplification and isolation for the :put signal. They include a buffer amplifier, a 30 Mc crystal-controlled "local" :illator, a balance modulator, a wide-band video amplifier, and a cathode follower.

1. **BUFFER AMPLIFIER** *(V-14)*. This tube, a 6AH6 sharp cut-off pentode, provides a single state of amplification for the output of the sweeping oscillator *(V-4)*. The amplified output is fed directly to the primary of slug-tuned transformer, *T-3*, in the balanced modulator.

2. **30-MC CRYSTAL OSCILLATOR** *(V-12 & V-13)*. This circuit comprises a cathode-coupled, dual-triode, crystal oscillator and a single-stage amplifier which function as a beat-frequency oscillator for the balanced modulator. The 30-Mc output of the 12AT7 oscillator stage is inductance-coupled to the amplifier *(V-13)*. The output of the amplifier stage, a stable 30-Mc frequency, is fed directly into the primary of the slug-tuned transformer *T-2* in the balanced modulator.

3. **BALANCED MODULATOR**. This circuit is composed of four type CK-705/1N294 crystal detectors connected across slug-tuned transformers. The input across *T-2* is the fixed 30-Mc signal from the 30-Mc crystal-controlled local oscillator. The input across *T-3* will be a 30 to 38-Mc sweeping frequency from *V-14*. After mixing and modulation, an intermediate frequency in the 50-kc to 8-Mc range is fed out through a three-section band-pass filter to the control grid of the video amplifier *(V-16)*.

4. **WIDE BAND VIDEO AMPLIFIER** *(V-16)*. This 6AH5 pentode provides a single stage of tuned amplification for the intermediate frequency coming from the balanced modulator. The INCREASE potentiometer *(R-122)* in the grid of this stage provides a *6 db range of amplitude control for the r-f signal appearing at the SWEEP OSC OUTPUT jack *J-3*. The output of the video amplifier is fed to the grid of the cathode follower.

5. **CATHODE FOLLOWER** *(V-17)*. This tube, a 6CL6 power pentode, functions both as an amplifier and as an impedance-matching circuit. Its output, a nominal 1.5V, is fed via the attenuator switches to the OUTPUT jack.

6. **OUTPUT CIRCUITS**. The r-f signal appearing on the cathode of *V-17* is fed thru a series of four precision, r-f attenuators (20 DB, 20 DB, 6 DB, 3 DB) each controlled by a separate switch. The effects of these four attenuators are additive, providing a total of 49 db of attenuation in addition to the *6 db provided by the r-f INCREASE control.

*approx.

MARKER CIRCUITS.

These circuits utilize the 30-38 Mc output of the sweeping oscillator to gener- e both the variable marker and the eight fixed markers. The marker circuitry in- udes a variable pulse generator, a crystal-controlled marker circuit, a common p generator, and an internal pip generator circuit.

1. CRYSTAL-CONTROLLED FIXED MARKER CIRCUIT.

a. Buffer Amplifier *(V-15)*. This stage is similar to *V-14*, providing a single stage of amplification and isolation for the fixed marker circuitry. The 30-38 Mc sweeping frequency is fed to the grid of *V-15* via resistor *R-111*. The amplified output is fed via the marker crystals, to the fixed marker circuit.

b. Marker Crystals *(Y-2 thru Y-9)* Crystals *Y-2* thru *Y-9* are used in absorption-type marker circuits to produce the eight crystal-controlled fixed markers. Each marker crystal is controlled by a separate MARKER switch. When one or more of the MARKER switches are in the upper position, the corresponding crystals are activated. Each crystal is resonant at a single frequency in the 50 kc to 8 Mc range. As the frequency of the sweeping oscillator passes thru a given crystal frequency, that crystal generates a train of oscillations which are rectified by germanium crystal diode *D-6* and applied to the control grid of the first trigger amplifier *V-9*.

c. Trigger Amplifiers *(V-9 & V-10)*. These two 12AU7 dual-triodes are used to provide four stages of conventional amplification for the trigger pulses generated by the marker crystals. The rectified triggering pulses from the crystal circuits are fed to the first half of *V-9*. The front panel PIP ADJust potentiometer *R-70* is used to adjust the bias on *V-10* to a point where a full stable complement of fixed pulses is produced without the appearance of spurious pips. The amplified output of *V-10* is fed back to the pip generator *(V-11)* and, via the INTernal PIP switch *(S-4)* to the internal pip amplifier *(V-8)*.

d. Pip Generator *(V-1)*. This stage employs a 12AT7 dual-triode in a one-shot multivibrator circuit. The output of the fixed marker trigger amplifiers *(V-9 & V-10)* and the variable marker circuit are fed to this tube. Cathode potentiometer *R-84* is set to allow the multivibrator to emit a single, positive pulse for each triggering signal reaching it from the marker circuits.

2. VARIABLE MARKER CIRCUITS *(V-5, V-6, V-7)*. These stages utilize the output of the sweeping oscillator in a tunable high-Q circuit to generate a single marker which will be continuously variable over the selected sweep width.

The output of the sweeping oscillator is fed to the grid of a 6AH6 buffer whose plate circuit is tunable over the selected sweeping range. The VARIABLE MARKER control *(C-29)* is adjusted to resonate this plate circuit at the desired variable marker frequency. Variable capacitor *(C-27)* is a fine frequency control, used in calibrating the VARIABLE MARKER control. The output of the tuned circuit is transformer-coupled *(T-4)* to the germanium crystal diode *(D-1)* which detects the signal and feeds it to the variable markers amplifier *(V-6)*. This tube, one-half of a 12AT7 dual triode, provides a single stage of amplification for the variable marker pulse before feeding it to the sync generator *(V-7)*.

The sync generator utilizes a 12AT7 in a Schmitt trigger circuit to generate a keying pulse for the variable marker. The repetition rate of the Schmitt trigger is determined by the setting of the internal variable pip generator potentiometer *(R-53)* in the grid of the second half of the tube. The output of the Schmitt trigger is fed both to the pip generator *(V-11)* and, via the INTernal PIP switch *(S-4)* to the internal pip amplifier *(V-8)*.

3. **INTERNAL PIP CIRCUIT** *(V-8)*. This circuit is used to generate zero-voltage, "suck-out" type, fixed and variable markers in the sweeping output, thus eliminating the need for a separate marker lead. These internal markers are produced by momentarily disabling the sweeping oscillator each time the sweeping frequency passes thru one of the energized fixed or variable marker frequencies. When the INTernal PIP switch *(S-4)* is in the on position, negative keying pulses from the fixed and variable marker circuits are fed to the first grid of the internal pip amplifier *(V-8)*. Consequently, the second half of the tube draws an increased current and lowers the common plate voltage of *V-8* and of the sweeping oscillator to a point where the latter tube is momentarily disabled.

SECTION V
MAINTENANCE

TROUBLE LOCATION.

If the operation of the **VIDALIGNER** appears to be defective in any respect, first ascertain that the cause of improper operation is not in the oscilloscope, the circuit under test, or the interconnecting cables. If a process of elimination indicates that the trouble originates in the **VIDALIGNER**, make the following preliminary checks:

1. Check the operation of all the circuits to determine the exact nature and extent of the defect.

2. Make a visual check to determine that all filaments are lit and that there are no loose connections or obviously damaged components.

3. Check the voltage level at the a-c line and the B+ input. The most common troubles encountered with the **VIDALIGNER** are weak or defective tubes, crystal diode failures, and occasional misalignments. The trouble location chart below may be used as a guide to isolate the trouble to a particular circuit or stage. *Figure 6*, a complete schematic of the **VIDALIGNER** frequency generating circuits, indicates the normal voltage measurements at significant points in the circuitry. The physical location of all tubes, potentiometers, switches and other major components is indicated on *Figures 4 & 5*, the component location diagrams. A complete schematic of the regulated power supply used with the **VIDALIGNER** is shown on *Figure 7*.

TROUBLE-SHOOTING CHART

SYMPTOM	REMEDIAL PROCEDURE
o horizontal deflection on scope.	Check sawtooth generating circuits *V-1*, *V-2*; check power supply.
nstable trace on oscilloscope.	Check sync generator *V-1*, square wave generator *V-2*; adjustment of *R-9*.
o vertical deflection on 'scope.	Check sweeping oscillator *V-4*; crystal oscillator *V-12*, *V-13*; internal pip amplifier *V-8*; diodes *D-2*, *D-3*, *D-4*, *D-5*.
o variable markers; fixed marker kay.	Check buffer *V-5*; amplifier *V-6*, sync generator *V-7*.
o fixed markers, variable marker kay.	Check trigger amplifiers *V-9*, *V-10*; diode *D-6*.
ixed variable markers okay at PIP UTPUT jack; "suck-out" markers efective.	Check INTernal PIP switch *S-4*, internal pip amplifier, *V-8*.
o marker output at PIP OUTPUT jack; suck-out" markers okay.	Check pip generator *V-11*, internal pip adjust control *R-84*.
oldover at end of sweep. "Suck-out" arkers not all same amplitude.	Check adjustment of internal blanking control *R-21*.

. **ALIGNMENT AND ADJUSTMENT.** *(See Figures 4 & 5 for location of adjustable components.)*

1. **PLATE VOLTAGE ADJUSTMENT.** The B+ potentiometer, located on the top of the power supply chassis, should be adjusted to provide a +250 volt d-c output.

2. **SAWTOOTH SWEEP CIRCUIT ALIGNMENT.**

a. Connect SWEEP OUTPUT terminals *(J-1)* to the vertical (Y-axis) input of a scope with calibrated face.

b. Adjust REPetition RATE potentiometer *(R-11)* to set repetition rate to approximately 60-cps line frequency.

c. Adjust internal sync lock control *(R-9)*, located on the rear of the r-f chassis deck, until pattern locks in.

d. Sweep output should have a regular triangular, and an amplitude of at least 6V peak-to-peak. Sync lock should hold over 30-degree rotation of REPetition RATE control.

3. **SWEEPING OSCILLATOR ALIGNMENT.**

a. Connect SWEEPing OSCillator OUTPUT jack *(J-3)* to vertical (Y-axis) input of 'scope.

b. Connect SWEEP OUTPUT terminals *(J-1)* to horizontal (X-axis) input of scope.

c. If the markers supplied with the equipment, do not include an 8 Mc marker, remove the nearest standard marker crystal, replacing it with a 38 Mc crystal. Energize the crystal markers.

d. Set SWEEP WIDTH Selector *(S-3)* to 0-8 position.

e. Set CENTERING potentiometer *R-32* to mid-position.

f. Adjust internal sweep width potentiometer *R-25*, located on the left side of the chassis, until the right end of the sweeping pattern corresponds with the 8 Mc marker.

g. Adjust variable capacitor *C-19* until the left end of the sweeping output trace coincides with the zero frequency pip.

h. Readjust first *R-25*, then *C-19* to optimize adjustment.

i. Replace nearest standard marker crystal with one cut to 35 Mc. Set SWEEP WIDTHselector to 0-5 Mc position.

j. Adjust *C-17* until sweeping output is 5 Mc wide and left end of trace coincides with zero frequency pip.

k. Set SWEEP WIDTHselector to 0-2 Mc position.

l. Replace nearest standard marker crystal with one cut to 32 Mc. Energize this marker.

m. Adjust *C-22*, until sweeping output is 2 Mc wide and left end of trace coincides with zero frequency pip.

n. Recheck adjustments on each range until width and center frequency alignments on all ranges are optimized.

4. MODULATOR AND R-F AMPLIFIER ADJUSTMENTS.

a. Set up equipment as shown in *Figure 2*.

b. Adjust core of *V-12* output transformer *T-1* to mid-point.

c. Adjust *V-12* plate trimmer *C-60* for maximum output.

d. Recheck first *T-1* adjustments until output is maximized.

e. Adjust cores of balanced modulator transformers *T-2* and *T-3* for maximum flat output.

f. Touch up BFO adjustments again; then recheck balanced modulator transformers.

g. Adjust cores of filter coils *L-11*, *L-12*, *L-13*, for maximum flat output.

h. Recheck adjustments on BFO, modulator and filters in that order. Output at SWEEPing OSCillator OUTPUT jack *(J-3)* should be at least 1.0 volt and flat across the range.

5. CRYSTAL MARKER CIRCUIT ALIGNMENT.

a. Set SWEEP WIDTHselector *(S-3)* to 0-8 Mc position.

b. Connect SWEEP OUTPUT to horizontal axis of scope.

c. Connect scope vertical (Y-axis) input to pin 7 of *V-10*, the second trigger amplifier.

d. Rotate pip INCREASE control until all markers are visible on the scope.

e. Adjust core of buffer plate tuning coil *L-2* for maximum output.

f. Adjust core of coil *(L-3 thru L-9)* in each tank to equalize and maximize all markers.

g. Remove lead connection *V-10* pin 7 to scope. Connect PIP OUTPUT jack to vertical (Y-axis) input of scope.

h. Throw all crystal MARKERS switches to off (lower) position. Rotate pip INCREASE control completely clockwise.

i. Set front-panel PIP ADJust control *(R-70)* to mid-position. Rotate internal pip adjust control *(R-84)* clockwise until random (free-running) pips appear.

j. Back off setting of *R-84* until random pips just disappear (approximately fifteen degrees).

k. Turn on all crystal MARKERS. Adjust pip INCREASE control until markers appear on scope trace.

l. Readjust *R-84* setting slightly to maximize range of front-panel PIP ADJust control.

5. VARIABLE MARKER CIRCUIT ALIGNMENT.

a. Set up equipment as shown in *Figure 2.*

b. Set SWEEP WIDTH selector to 0-8 Mc position.

c. Turn on highest crystal MARKER. Adjust horizontal (X-axis) positioning control on scope until marker falls on one of the vertical lines of the scope calibration. Turn off crystal MARKER.

d. Adjust VARIABLE MARKER control until dial reading is same as that of highest fixed marker.

e. Set front panel calibrate control (small control immediately to left of VARIABLE MARKER control) to mid-position.

f. Adjust variable capacitor *C-32* until variable marker coincides with scope reference grid established in step *c* above.

g. Energize lowest frequency crystal MARKER. Adjust horizontal (X-axis) positioning controls on scope until fixed marker coincides with one of the vertical lines on the scope face calibration.

h. Adjust VARIABLE MARKER until dial reading corresponds to crystal MARKER frequency.

i. Adjust core of transformer *T-4* until variable marker coincides with scope face reference line established in step *g* above.

j. Set SWEEP WIDTH selector to 0-5 Mc position. Energize highest crystal marker in this range.

k. Adjust VARIABLE MARKER control until dial reading coincides with crystal MARKER frequency. Adjust variable capacitor *C-33* for zero beat.

l. Set SWEEP WIDTH selector to 0-2 Mc position. Energize highest marker in this range.

m. Adjust VARIABLE MARKER control until dial reading corresponds to frequency of energized crystal MARKER. Adjust variable capacitor C-29 for zero beat.

n. Recheck all four adjustments to eliminate interaction effects. Each variable marker should be within ±0.5% of the corresponding crystal marker.

o. Variable capacitor C-29 is used to adjust the rate at which the variable marker pulses appear at the PIP OUTPUT jack. Turn off all crystal MARKERS. Adjust C-29 for a single clear (variable) marker on the scope trace.

SECTION VI
200A POWER SUPPLY

DESCRIPTION.

The 200A power supply is a regulated d-c voltage supply with output voltage adstable between 225 and 275 volts. The unit operates from a 117V, 60 cps power urce. Constructed on an individual chassis, the supply is a completely self-ntained unit designed for operation in conjunction with a test instrument re-iring a highly stable d-c voltage source. The supply is enclosed in the same binet as the associated r-f circuitry.

POWER SUPPLY CIRCUIT DETAILS.

This regulated power supply furnishes all filament and d-c power required by the f circuits of the test equipment.

1. RECTIFIER CIRCUIT. High voltage is supplied from the secondary of T-1 to the conventional full wave rectifier V-1, a 5U4GB dual diode. The rectified output voltage is filtered by C-1, L-1 and C-2 and fed to the voltage regulator circuits.

2. VOLTAGE REGULATOR CIRCUIT. The filtered d-c voltage from V-1 is fed through a regulating circuit comprising V-2, V-3 and V-4 to the output terminal. V-2, V-3 and V-4 are effectively connected in parallel and function as a variable series resistance to control the output voltage. The remaining stages in the power supply (V-5, V-6, V-7) detect and amplify any significant output voltage changes and feed them to the control stage. They function in the following manner:

The neon-glow tubes (I-1 & I-2) in the V-6 circuit have a non-linear effect which causes a small increase at the power supply output to produce a relatively large change at the grid of V-6. This tube, its cathode potential regulated by V-7, then draws a higher plate current, causing a dip in voltage at the plate of V-6 and grid of V-5. This decrease in V-5 grid voltage lowers its plate current reducing the voltage developed across R-11.

Since R-11 is also the bias resistor for the control tubes, V-2, V-3 and V-4, their plate to cathode resistance increases, thereby lowering the power supply's output voltage.

For a decrease in output voltage, the controlling action described above is reversed. *R-15* provides an output voltage adjustment for initially setting the d-c output voltage to the required value.

MAINTENANCE.

1. VOLTAGE ADJUSTMENT. The setting of *R-15* determines the d-c voltage output of the power supply. To adjust *R-15*, connect a d-c voltmeter at the B+ terminals on the associated equipment; with all power on and power supply under full load, set *R-15* to the required voltage input for the associated equipment.

2. TROUBLE LOCATION. The following chart should aid in locating troubles in the power supply:

SYMPTOM	PROBABLE CAUSE AND CORRECTION
Zero output voltage from power supply; no heaters light.	Check fuse; if blown, check *C-1* & *C-2* for short before replacing. Also check *V-1* for short. Check a-c wiring; check *T-1*.
Zero output voltage, all tubes light.	Check *V-1*. Check *C-2*, *C-3* & *C-5* for shorts. Check for open HV winding on *T-1*; check associated equipment for B+ short.
Low output voltage; poorly regulated.	Check tubes *V-1*, *V-2*, *V-3*, *V-4*, *V-5*, *V-6* & *V-7*. Check *C-4* & *C-6* for shorts. Check *R-15* & *R-17*.
Voltage output higher than normal. Poor regulation.	Check *I-1* or *I-2*. Open *R-15*. Check tubes *V-5*, *V-6* & *V-7*.
Excessive ripple in d-c output.	Check *C-1* & *C-2*. Check for excessive load on supply.

SECTION VII

PARTS LIST

. POWER SUPPLY.

PACITORS:

1 6μF, 600V, OIL-FILLED
2 2μF, 600V, OIL-FILLED
3 0.01μF, 500V DISC CERAMIC
4 0.1μF, 400V, MOLDED PAPER
5 *a* - 20μF, 450V, ELECTROL.
b - 20μF, 450V, ELECTROL.
6 1000μμF, 500V, CERAMIC

TUBES:

V-1 5U4GB
V-2 6AQ5
V-3 6AQ5
V-4 6AQ5
V-5 12AU7
V-6 6AG5
V-7 0B2

MISCELLANEOUS:

F-1 FUSE, 3 AMP, 250V
I-1 NEON GLOW LAMP, G.E. NE2
I-2 NEON GLOW LAMP, G.E. NE2
L-1 8.5 H AT 200 MA D-C; 120 OHMS D-C RESISTANCE
T-1 HV-TRANSFORMER (KA-2520)
J-1 JONES S-306-AB

SISTORS: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)

1 330K; 1W
2 100; 1W
3 33; 1W
4 100; 1W
5 100; 1W
6 33; 1W
7 100; 1W
8 100; 1W
9 33. 1W

R-10 100; 1W
R-11 150K; 1W
R-12 270K
R-13 6.8K; 1W
R-14 12K; 2W
R-15 100K; VARIABLE B+ ADJ.
R-16 330K; 1W
R-17 180K

MAIN CHASSIS.

SISTORS: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT. 10% TOLERANCE RESISTORS.)

1	100 K
2	470 K
3	180 K
4	8.2 K
5	3.9 K
6	1 M
7	10 K, 2 WATT
8	470 K
9	500 K, POT, SYNC LOCK (INT.)
10	220 K
11	100 K, POT, REPETITION RATE
12	3.3 M
13	100 K
14	100 K
15	3.3 M
16	270 K
17	150 K
18	150 K
19	1.2 M
20	1 M
21	100 K, POT, BLANKING (INT.)
22	430 K
23	270 K
24	1 M
25	500 K, POT, SWEEP WIDTH (INT.)
26	330 K
27	180
28	240
29	3.3 M
30	3.3 M
31	470 K
32	10 K, POT CENTERING (EXT.)
33	10 K
34	10 K
35	10
36	10 K, 1 WATT
37	100
38	68 K, 2 WATT
39	82 K, 1 WATT
40	470 K
41	15 K, 1 WATT
42	100 K
43	51 K
44	150
45	180 K
46	470 K
47	100 K
48	8.2 K
49	3.9 K
50	10 K, 2 WATT
51	1 M
52	NOT USED
53	500 K, POT VAR. PIP GEN. ADJ. (INT.)
54	560 K
55	47 K
56	47 K, 1 WATT PIP (INT.)
57	6.8 K, 1 WATT
58	1.5 K
59	3.3 K
60	47 K
61	100
62	240
63	120 K
64	100 K
65	100 K
66	470
67	470
68	240
69	100 K
70	500 K, POT, PIP ADJ.
71	100 K
72	240
73	100 K
74	100 K
75	470
76	470
77	240
78	100 K
79	20 K
80	100 K
81	200 K
82	39 K
83	10 K
84	10 K, POT, PIP ADJUST (INT.)
85	47 K, 1 WATT
86	220 K
87	100 K, PIP INCREASE (EXT.)
88	4.7 K, 2 WATT
89	100
90	470
91	10 K
92	10
93	220
94	10
95	220
96	10
97	4.7 K, 2 WATT
98	4.7 K, 2 WATT
99	150
100	56 K, 1 WATT
101	47 K
102	33 K, 1 WATT
103	180
104	4.7 K, 2 WATT
105	4.7 K, 2 WATT
106	10
107	33 K, 1 WATT
108	4.7 K, 2 WATT
109	4.7 K, 2 WATT
110	100
111	300
112	390
113	1.5 K
114	1.5 K
115	1.5 K
116	1.5 K
117	1 K
118	1 K
119	1 K
120	500
121	51
122	100, POT, R-F OUTPUT LEVEL INCREASE
123	51
124	100
125	4.7 K, 1 WATT
126	1 K, 1 WATT
127	22
128	120
129	27K, 1 WATT
130	470 K
131	4.7 K, 2 WATT
132	220
133	33
134	100
135	1 K, 1 WATT
136	10 K, 1 WATT
137	620
138	82
139	330
140	82
141	82
142	330
143	82
144	130
145	100
146	130
147	390
148	24
149	390
150	NOT USED
151	NOT USED
152	NOT USED
153	NOT USED
154	NOT USED
155	10
156	10
157	10
158	10
159	10

ACITORS: (CAPACITORS IN μμF UNLESS OTHERWISE STATED.)

	0.01μF; DISC CERAMIC
	0.02μF; DISC CERAMIC
	30
	20
	2000
	2000
	0.25μF
	0.05μF
	0.01μF; DISC CERAMIC
0	0.01μF; DISC CERAMIC
1	0.25μF
2	NOT USED
3	91
4	*a* & *b* 20μF ELECTROLYTIC
5	8.2
6	8.2
7	1-6 VARIABLE
8	8.2
9	1-6 VARIABLE
20	10
21	5
22	1-6 VARIABLE
23	2.2
24	1000
25	1000
26	10
27	3-15 VARIABLE
28	50
29	0-50 VARIABLE; VAR MARKER
30	1000
31	0.25μF
32	1-8 VARIABLE
33	1-8 VARIABLE
C-34	1-8 VARIABLE
C-35	0.5μF
C-36	0.25μF
C-37	0.01μF; DISC CERAMIC
C-38	1000
C-39	3-13 VARIABLE
C-40	0.02μF; DISC CERAMIC
C-41	0.02μF; DISC CERAMIC
C-42	1000
C-43	1000
C-44	0.25μF
C-45	0.25μF
C-46	1000
C-47	1000
C-48	1000
C-49	500
C-50	1000
C-51	0.25μF
C-52	0.25μF
C-53	33
C-54	390
C-55	0.02μF; DISC CERAMIC
C-56	1000
C-57	1000
C-58	100
C-59	1000
C-60	3-13 VARIABLE
C-61	1000
C-62	1000
C-63	1000
C-64	100
C-65	500
C-66	1000
C-67	1000
C-68	1000
C-69	1000
C-70	500
C-71	1000
C-72	8.2
C-73	8.2
C-74	8.2
C-75	8.2
C-76	8.2
C-77	8.2
C-78	8.2
C-79	8.2
C-80	100
C-81	100
C-82	100
C-83	10μF; ELECTROLYTIC
C-84	25μF; ELECTROLYTIC
C-85	10μF; ELECTROLYTIC
C-86	0.01μF; DISC CERAMIC
C-87	10μF; ELECTROLYTIC
C-88	0.05μF
C-89	10μF; ELECTROLYTIC
C-90	200
C-91	0.005μF
C-92	NOT USED
C-93	1000
C-94	1000
C-95	1000
C-96	1000
C-97	1000
C-98	0.01μF
C-99	4-30 VARIABLE

BES:

1	5963
2	6J6
3	6V6
4	12AT7
5	6AH6
6	12AT7
7	12AU7/5963
8	12AU7
9	12AU7
10	12AU7
11	12AT7
12	12AT7
13	6AH6
14	6AH6
15	6AH6
16	6AH6
17	6CL6

SWITCHES:

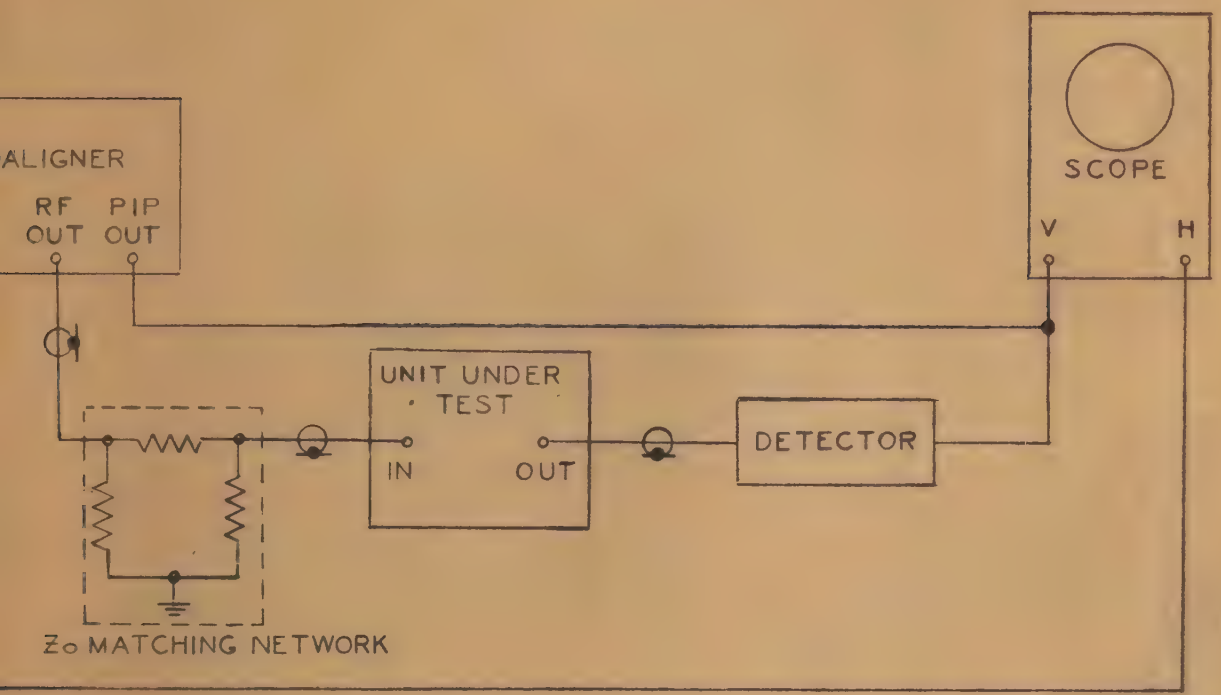
S-1	SPST ON-OFF A-C LINE SWITCH
S-2	STANDBY-ON SWITCH
S-3	SWEEP WIDTH SELECTOR SWITCH
S-4	DPDT INTERNAL PIP ON-OFF SWITCH
S-5	THRU S-8 DPDT ATTENUATOR SWITCHES
S-9	THRU S-16 DPDT MARKERS ON-OFF TOGGLE SWITCHES

CONNECTORS:

J-1	SWEEP OUTPUT
J-2	PIP OUTPUT
J-3	SWEEPING OSCILLATOR OUTPUT
P-1	JONES P-306-CCT. POWER
P-2	JONES P-302-CCT. FAN

ISCELLANEOUS:

-1	THRU D-7 GERMANIUM CRYSTAL DIODES; CK-705-A/1N294
-1	PILOT LIGHT
-1	SATURABLE REACTOR;
	a. CONTROL WINDING
	b. SECONDARY WINDING
	c. PICKOFF LOOP
-2	NOT USED
-3	THRU L-13 SPECIAL COILS
-14	SPECIAL TOROID COIL



CK DIAGRAM INTERCONNECTING VIDALIGNER

FINISH:

SCALE:

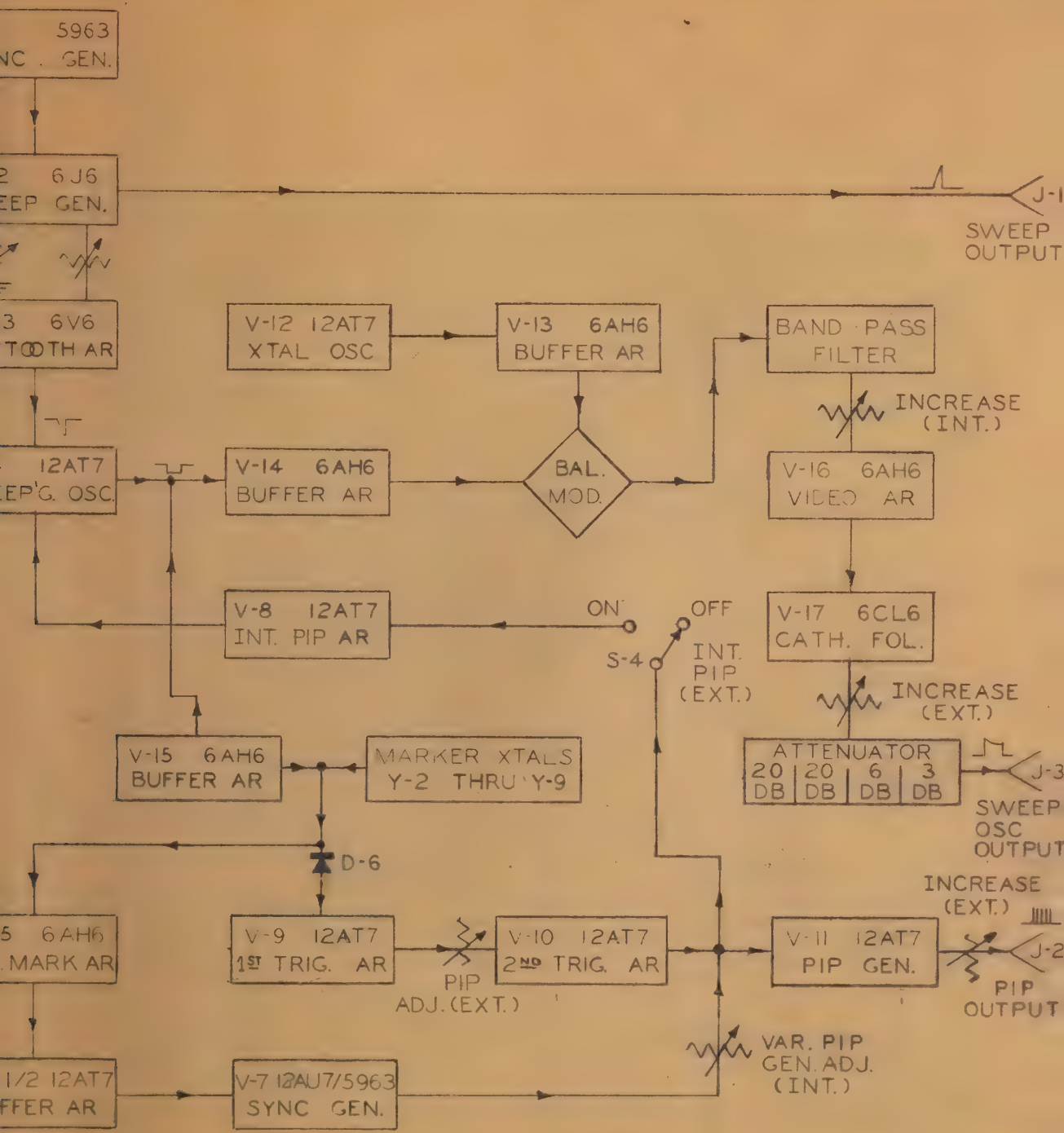
NS TOLERANCES UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± .005

CHANGE	DATE	APP.

KAY ELECTRIC CO.
PINE BROOK, N. J.

DWN. BY AWP DATE 12-5-57
APP. BY C.H. DATE 12-5-57

DWG. NO. KA5548A



ALIGNER - FUNCTIONAL BLOCK DIAGRAM

FINISH:	SCALE:

SIONS TOLERANCES UNLESS OTHERWISE SPECIFIED:
AL DIMENSIONS ± .002 FRACTIONAL DIMENSIONS ± .005

CHANGE	DATE	APP.

KAY ELECTRIC CO.
PINE BROOK, N. J.

DWN. BY J.L.K.	DATE 11-29-56
APP. BY [illegible]	DATE 12-7-56

DWG. NO. KA-5156

APP CO., INC. KP-1001 11854

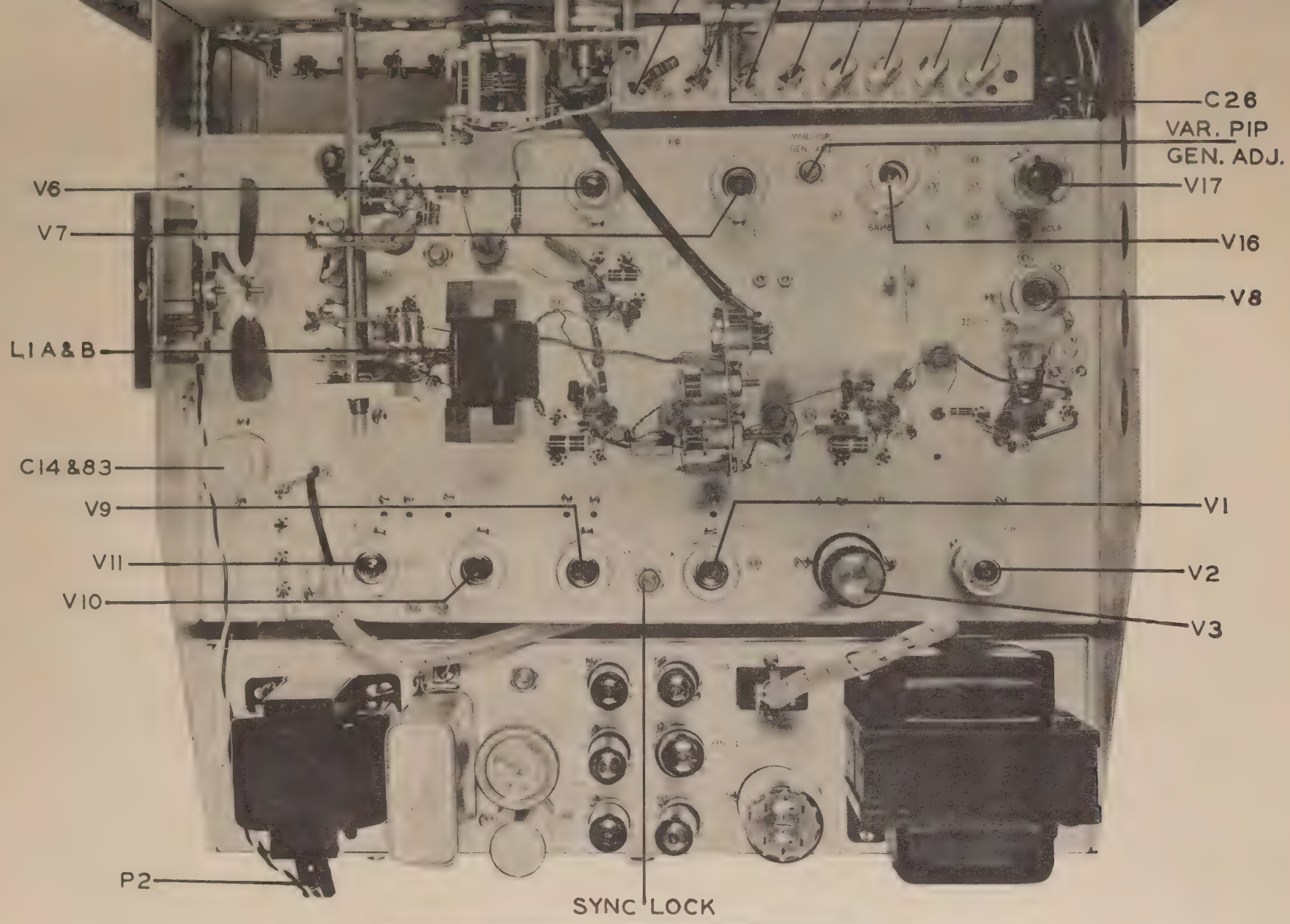


Figure 4. Component Location, Top of Chassis.

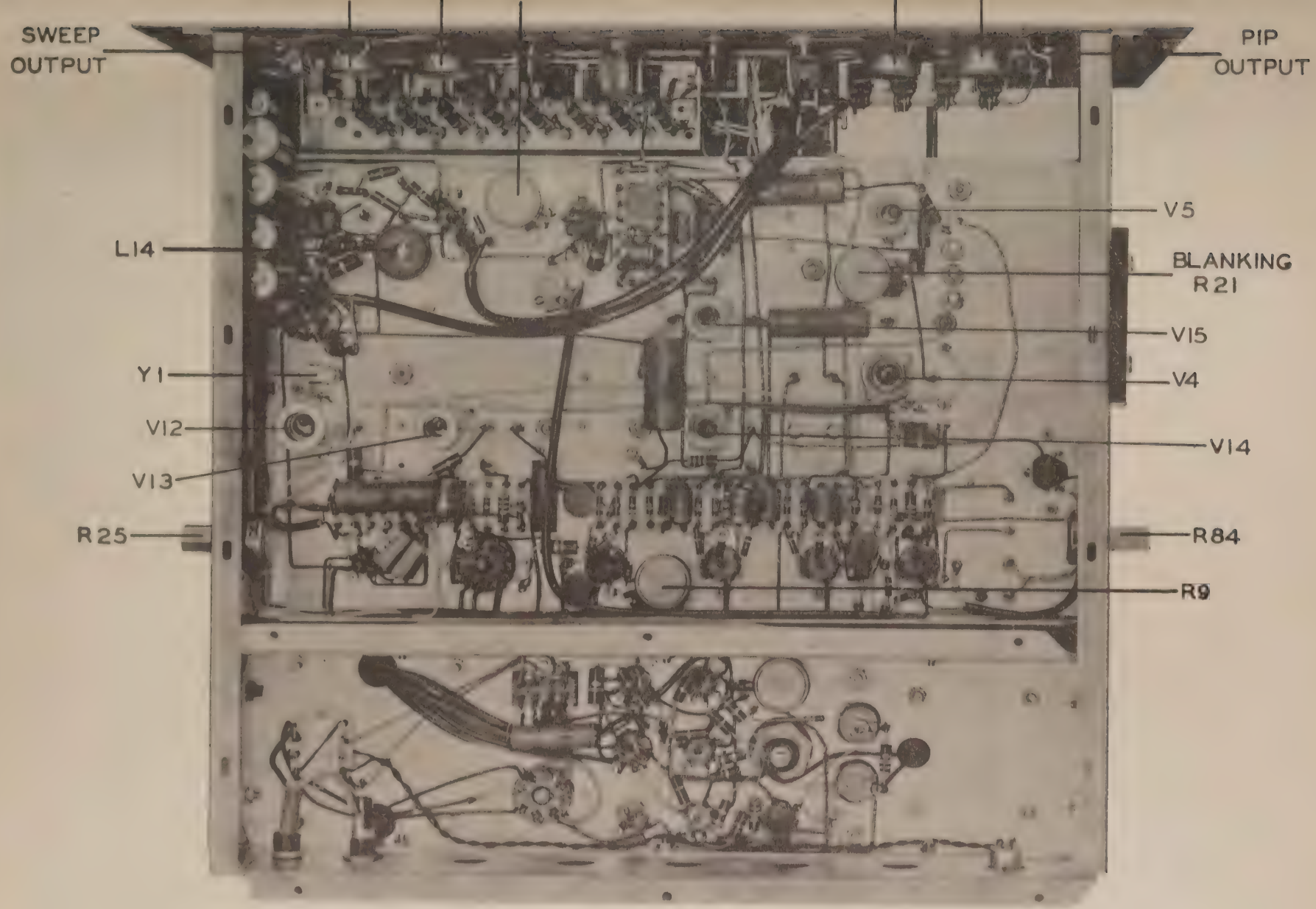
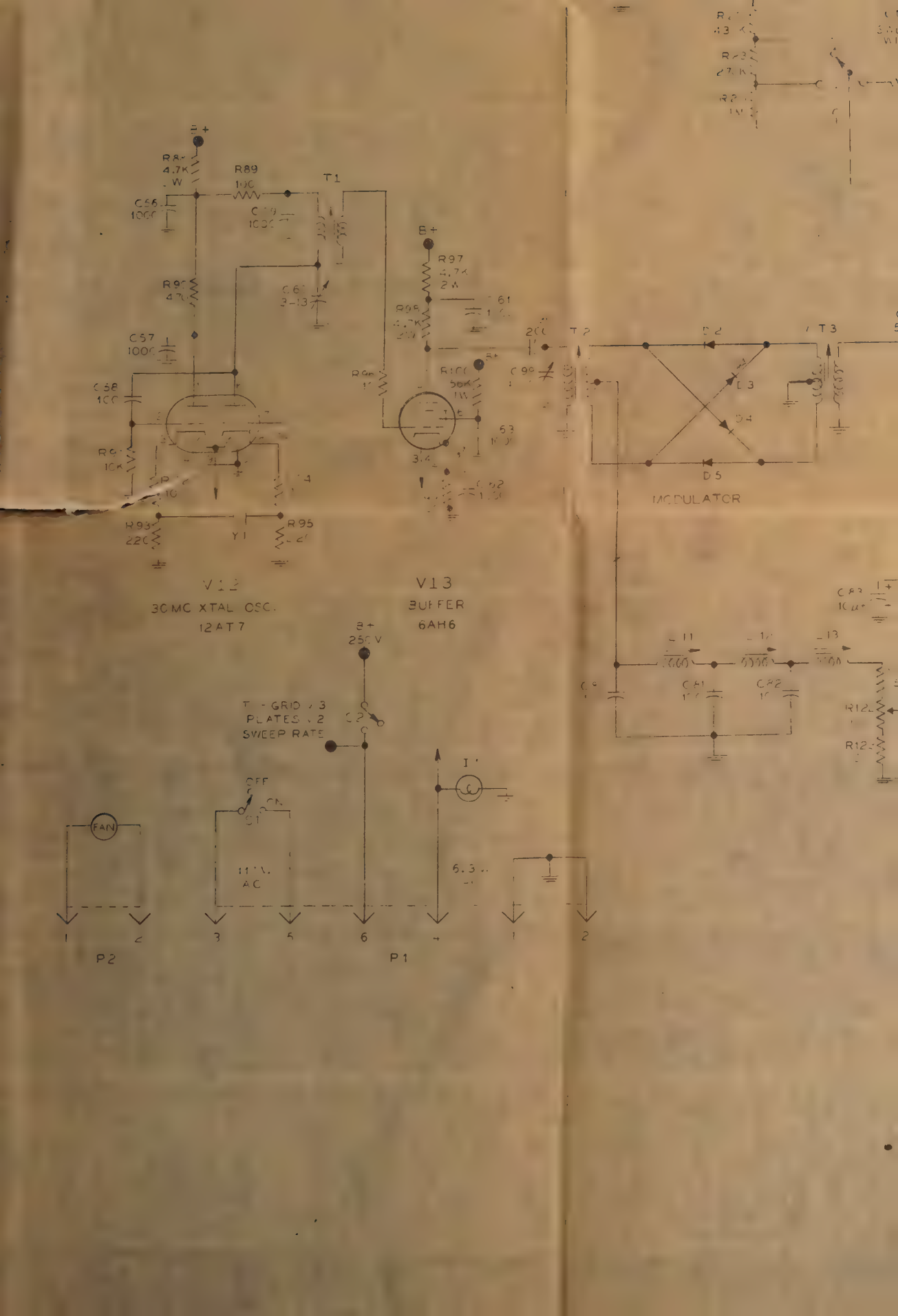


Figure 5. Component Location, Bottom of Chassis


B+
R88
4.7K
1 W
R89
100
T1
C56
1000
C59
1000
R90
47K
C60
3-13
C57
1000
C58
100
R91
10K
R92
10K
R93
220
Y1
R95
B+
R97
4.7K
2 W
R98
4.7K
2 W
C61
R100
56K
1W
C63
100
C64
100
C62
100
V12
30MC XTAL OSC.
12AT7
V13
BUFFER
6AH6
B+
250 V
T - GRID
PLATES
SWEEP RATE
C2
OFF
ON
S1
FAN
117 V.
AC
I'
6.3 V.
P2
P1
T2
T3
D2
D3
D4
D5
L3
MODULATOR
C81
C82
R124
R125

SECTION VII
200 ASM POWER SUPPLY

ESCRIPTION.

ower Supply No. 200 ASM is a regulated d-c ge supply with output voltage adjustable en 225 and 275 volts. The unit operates from V, 60 cps power source. Constructed on an idual chassis, the supply is a completely contained unit designed for operation in nction with a test instrument requiring a stable d-c voltage source. The supply is ly enclosed in the same cabinet housing the ated r-f circuitry.

OWER SUPPLY CIRCUIT DETAILS.

his regulated power supply furnishes all nt and d-c power required by the r-f cir- of the test equipment.

Rectifier Circuit. High voltage is sup- ied from the secondary of *T-1* to the con- ntional full wave rectifier diodes. The ctified output voltage is filtered by *C-1*, *1* and *C-2* and fed to the voltage regulator rcuits.

Voltage Regulator Circuit. The filtered c voltage from *D-1* to *D-6* is fed through a gulating circuit comprising *V-1*, *V-2* & *V-3* the output terminal. *V-1*, *V-2* and *V-3* are fectively connected in parallel and function a variable series resistance to control the tput voltage. The remaining stages in the wer supply (*V-4*, *V-5*, *V-6*, *V-7*) detect and olify any significant output voltage changes and feed them to the control stage. They function in the following manner:

Condenser *C-3* and regulator tube *V-7* transmit variations in the B+ output to the grid of tube *V-5*. This tube, its cathode potential regulated by *V-6*, then draws a greater or lesser plate current, an increase in plate current, causing corresponding plate voltage fluctuations. These fluctuations are transmitted through the cathode follower *V-4* to the grids of the passage tubes *V-1*, *V-2* and *V-3*, where they correct the original variations in the B+ output.

Since *R-12* is also the bias resistor for the control tubes, *V-1*, *V-2* and *V-3*, their plate to cathode resistance decreases, thereby lowering the power supply's output voltage.

For a decrease in output voltage, the controlling action described above is reversed. *R-16* provides an output voltage adjustment for initially setting the d-c output voltage to the required value.

C. MAINTENANCE.

1. Voltage Adjustment. The setting of *R-16* determines the d-c voltage output of the power supply. To adjust *R-16*, connect a d-c voltmeter at the B+ terminals on the associated equipment; with all power on and power supply under full load, set *R-16* to the required voltage input for the associated equipment.

2. Trouble Location. The following chart should aid in locating troubles in the power supply.

SYMPTOM	PROBABLE CAUSE AND CORRECTION
ZERO OUTPUT VOLTAGE FROM POWER SUPPLY; NO HEATERS LIGHT.	CHECK FUSE; IF BLOWN, CHECK C-1 AND C-2 FOR SHORT BEFORE REPLACING. ALSO CHECK D-1 TO D-6 FOR SHORT. CHECK A-C WIRING; CHECK T-1 AND L-1.
ZERO OUTPUT VOLTAGE, ALL TUBES LIGHT.	CHECK D-1 TO D-6. CHECK C-2, C-5 AND C-4 FOR SHORTS. CHECK FOR OPEN HV WINDING ON T-1; CHECK ASSOCIATED EQUIPMENT FOR B+ SHORT.
LOW OUTPUT VOLTAGE; POORLY REGULATED.	CHECK TUBES V-1, V-2, V-3, V-4, V-5, V-6 AND V-7. CHECK C-3 AND C-6 FOR SHORTS. CHECK R-16 AND R-15.
VOLTAGE OUTPUT HIGHER THAN NORMAL. POOR REGULATION.	CHECK V-7. OPEN R-16. CHECK TUBES V-4, V-5 AND V-6.
EXCESSIVE RIPPLE IN D-C OUTPUT.	CHECK C-1 AND C-2. CHECK FOR EXCESSIVE LOAD ON SUPPLY.

D. 200 ASM POWER SUPPLY PARTS LIST.

CAPACITORS:

C-1	6μF, 600V, OIL-FILLED
C-2	2μF, 600V, OIL-FILLED
C-3	0.1μF, 400V, PAPER
C-4	A & B, DUAL ELECTROLYTIC, 2 X 20μF, 450V
C-5	0.01μF, 500V, CERAMIC DISC
C-6	1000μμF, 500V, CERAMIC

RESISTORS:

R-1	330 K, 1 W	R-9	100, 1 W
R-2	33, 1 W	R-10	100, 1 W
R-3	100, 1 W	R-11	270 K, ½ W
R-4	33, 1 W	R-12	150 K, 1 W
R-5	100, 1 W	R-13	3.3 K, 1 W
R-6	33, 1 W	R-14	5.6 K, 2 W
R-7	100, 1 W	R-15	47K, ½ W
R-8	100, 1 W	R-16	50 K, POT B^+ ADJ.
		R-17	330 K, 1 W

SILICON RECTIFIERS:

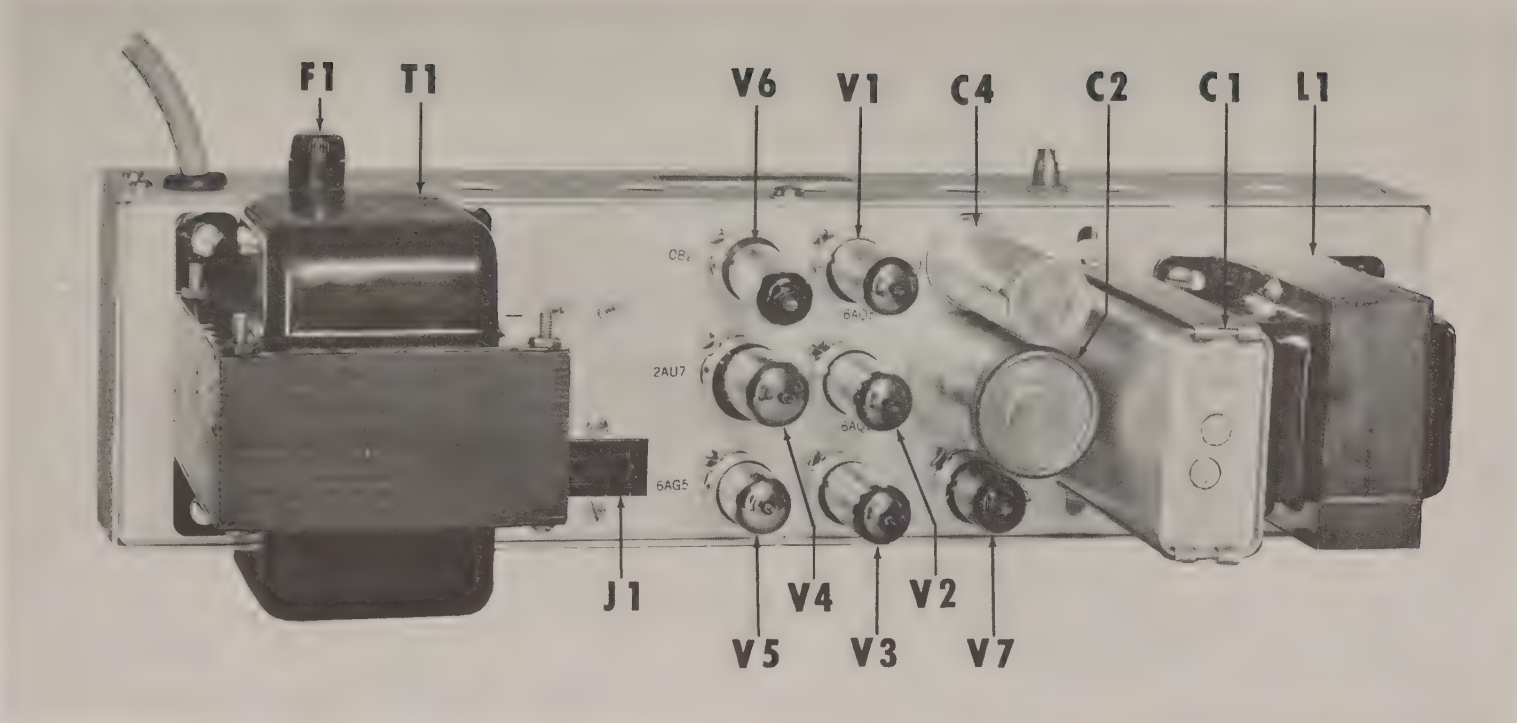
D-1	M-500
D-2	M-500
D-3	M-500
D-4	M-500
D-5	M-500
D-6	M-500

TUBES:

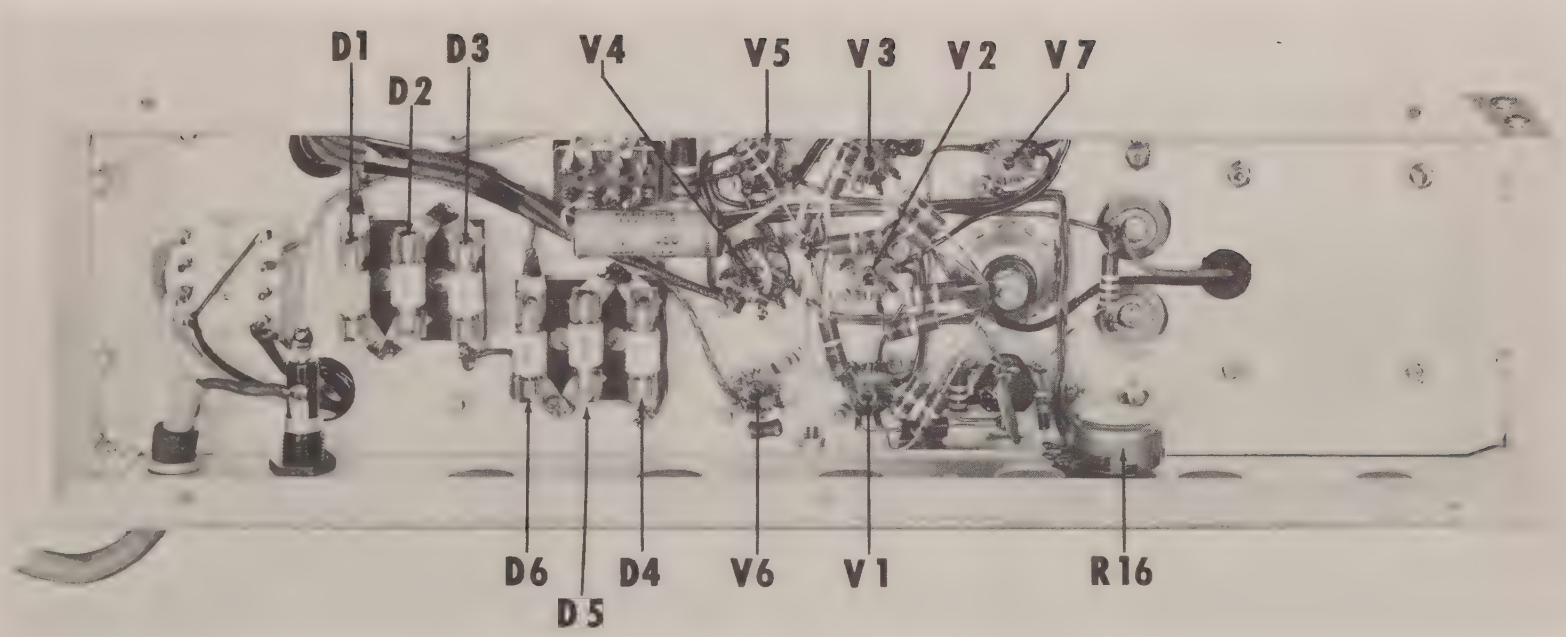
V-1	6AQ5
V-2	6AQ5
V-3	6AQ5
V-4	12AU7
V-5	6AG5
V-6	0B2
V-7	5651

MISCELLANEOUS:

F-1	3A, 250V, FUSE
J-1	JONES S-306-AB
L-1	8 HY, KAY #5501
P-1	AC LINE CORD
T-1	POWER TRANSFORMER, KAY #5361



200 ASM Power Supply Component Location, Top of Chassis



200 ASM Power Supply Component Location, Bottom of Chassis

Voltage & Resistance Readings

VOLTAGE READINGS

NO.	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V-1	6AQ5	250V	260V	*6.3VAC	*6.3VAC	425V	425V	250V		
V-2	6AQ5	250V	260V	*6.3VAC	*6.3VAC	425V	425V	----		
V-3	6AQ5	250V	260V	*6.3VAC	*6.3VAC	425V	425V	----		
V-4	12AU7	425V	245V	250V	*6.3VAC	*6.3VAC	440V	245V	250V	*6.3VAC
V-5	6AG5	100V	105V	*6.3VAC	*6.3VAC	245V	185V	105V		
V-6	OB2	----	----	----	----	105V	----	----		
V-7	5651	250V	----	----	----	----	----	170V		

VOLTAGE READINGS TAKEN WITH STANDBY (S-15) SWITCH ON.

*VOLTAGE READINGS TAKEN ACROSS FILAMENTS.

RESISTANCE READINGS

V-1	6AG5	150K	450K	----	----	260K	260K	150K		
V-2	6AG5	150K	450K	----	----	260K	260K	----		
V-3	6AG5	150K	450K	----	----	260K	260K	----		
V-4	12AU7	260K	550K	150K	----	----	260K	550K	150K	----
V-5	6AG5	58K	325K	----	----	550K	325K	325K		
V-6	OB2	----	----	----	----	325K	----	----		
V-7	5651	325K	----	----	----	----	----	100K		

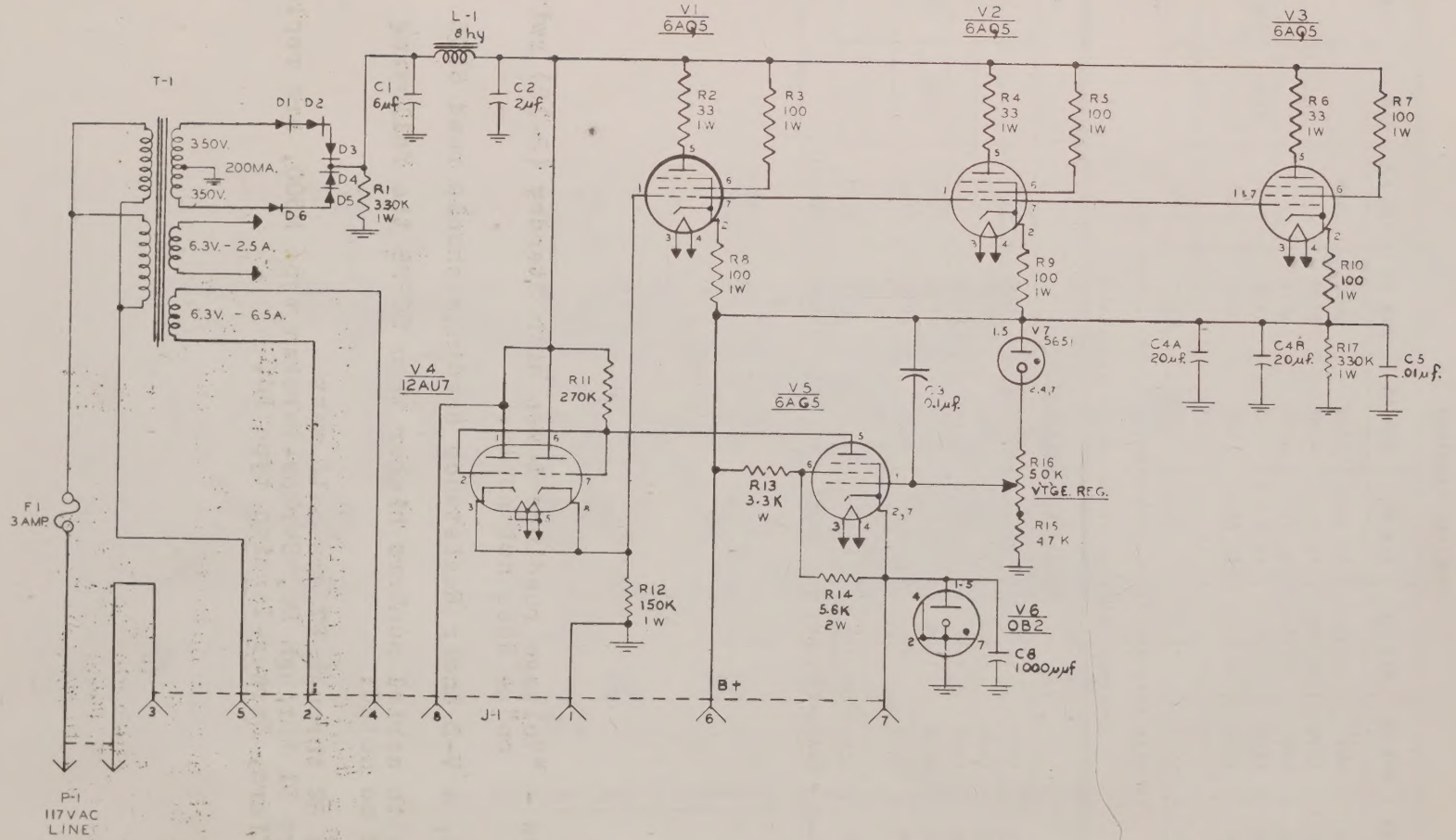
RESISTANCE READINGS TAKEN WITH POWER SUPPLY DISCONNECTED FROM UNIT.

tatement above - "Voltage readings taken with Standby (S-15) switch on" - does not apply.

ubes V-1, V-2, & V-3 under Resistance Readings should read 6AQ5

n equipment with serial numbers higher than 20898 the following nanges should be noted:

Resistors R2 through R7 are half watt
Rectifiers D1 through D6, Sarkes-Tarzian type M500, are replaced y four rectifiers, Sarkes-Tarzian type F6.



200 ASM Power Supply Schematic, KB-5456-C

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